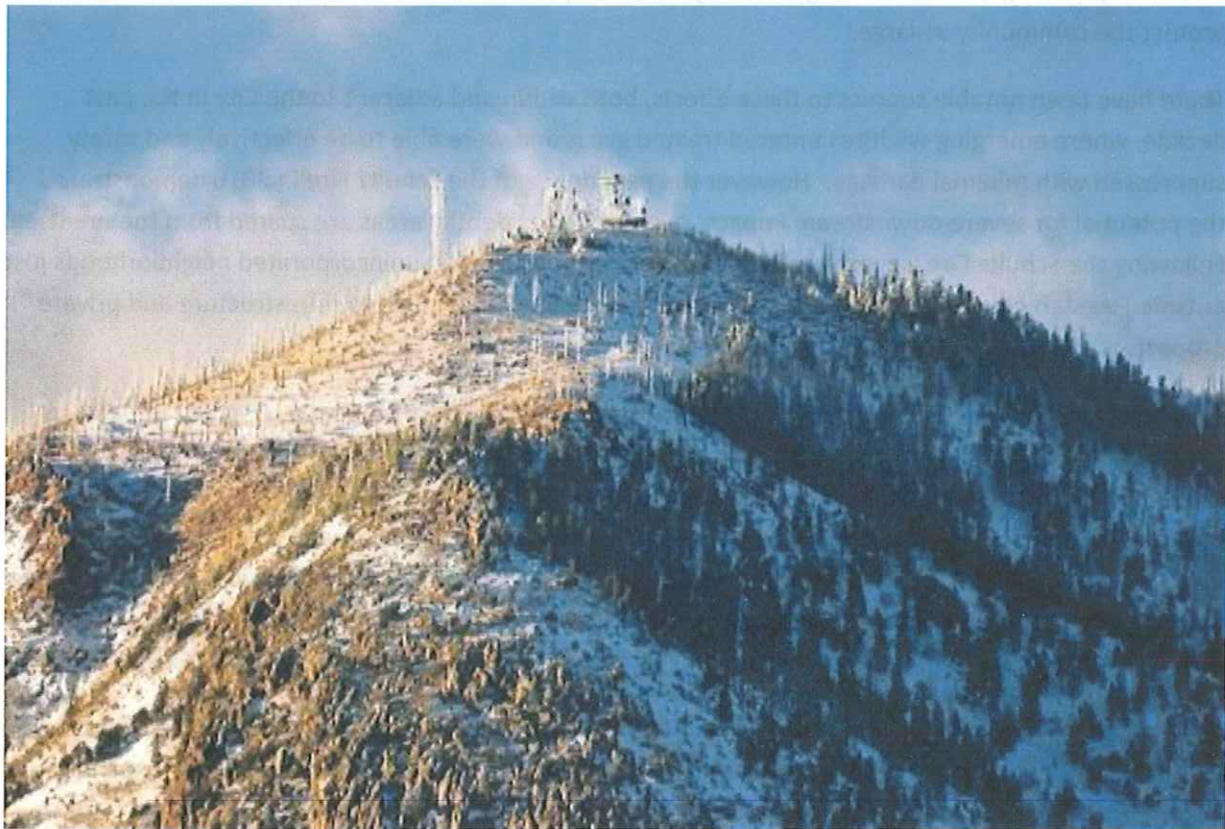


## **Flagstaff Watershed Protection Project Executive Summary & Implementation Plan**



**The City of Flagstaff, Arizona and the Flagstaff Ranger District, Coconino  
National Forest**

**Southwestern Region**

**December 2012**

## *Executive Summary*

During the November 2012 elections, residents of Flagstaff, AZ approved a \$10 million bond to support forest restoration work within key watersheds on the Coconino National Forest and State of Arizona lands. Identified on the ballot as the “Forest Health and Water Supply Protection Project,” the planning effort on the National Forest segment will now be known as the “Flagstaff Watershed Protection Project.” This is one of only a handful of examples in the country where forest restoration work on the National Forests is being funded by a municipality, and the known instance where such an effort is funded from municipal bonds.

The Coconino National Forest, which surrounds Flagstaff, has invested considerable energy and resources in restoring forest ecosystems and reducing fire danger over the past decade, and has treated hundreds of thousands of acres. Likewise, the City of Flagstaff has pioneered efforts within the City itself, and has worked pro-actively with various partnerships, including the Greater Flagstaff Forests Partnership (GFFP), and land management agencies for years to restore forests, reduce fire danger, and protect the community at-large.

There have been notable success to these efforts, both within and adjacent to the City in the past decade, where emerging wildfires entered treated areas and were able to be effectively and safely suppressed with minimal damage. However the experience of the Schultz Fire in 2010 demonstrated the potential for severe downstream impacts even when residential areas are spared from the fire itself. Following the Schultz Fire, severe and repeated flooding occurred in unincorporated neighborhoods just outside Flagstaff city limits, causing tens of millions of dollars of damage to infrastructure and private property.

Projections indicate that a wildfire on the steep slopes above Flagstaff could cause similar impacts to large portions of the City of Flagstaff (Figure 1), and that a wildfire and subsequent erosion on the steep slopes of Mormon Mountain could render 50% of the city’s water supply (Lake Mary Reservoir) unsuitable. These areas have not been adequately addressed in the past due to several complicating factors, including steep and rocky terrain, wildlife and social concerns, and economic infeasibility due to low timber value and the costs of treatments. The \$10 million bond provides an opportunity to work collectively on a solution to address these difficult but crucial areas affecting the City of Flagstaff.

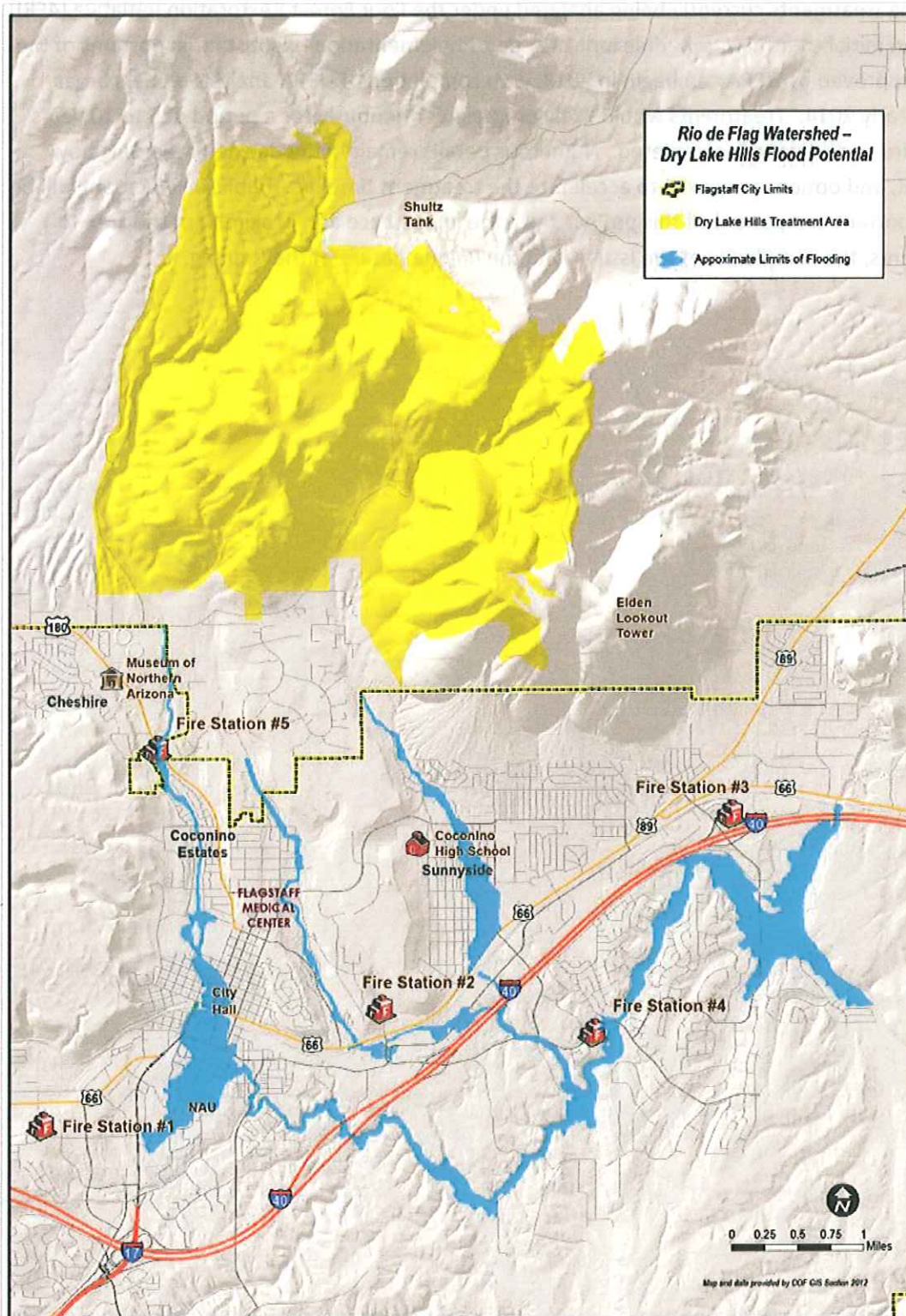
This document is a first step in framing project objectives, the current situation, tasks to be completed, and a rough timeline for accomplishments. This document will evolve over time, and may expand to include the full extent of the project, including treatments on State lands.

The risks of wildfire and post-wildfire flooding cannot be completely eliminated, but the objective guiding this effort will be to reduce those risks as effectively as possible given the constraints inherent to the project area (inaccessible, rocky terrain; presence of Threatened species; cost of treatments; etc.). Every treatment option will be considered, something that has never been feasible until the passage of the bond initiative.

The effort will include a combination of treating areas already approved by previous NEPA decisions, analyzing new areas, re-analyzing areas where all treatment options were not previously considered, and accelerating treatments currently being analyzed under the Four Forest Restoration Initiative (4FRI) (see Map 3). An initial treatment schedule indicates that implementation of substantial portions of the areas already approved by NEPA can begin in 2013, with completion of NEPA analysis on new areas anticipated in early 2014. Treatments would likely progress continuously for a period of 5 to 10 years before the entire undertaking is completed. Numerous details remain to be decided regarding how funds are spent, and options may exist to accelerate the treatment timeline. Public involvement will be a large and important component of this project given the importance and proximity of the area to Flagstaff residents, the complexity of the issues, and the unique nature of the funding.



Figure 1: Portion of the Rio de Flag Watershed with anticipated flooding locations, developed by the City Stormwater division<sup>1</sup>



<sup>1</sup> Area identified in yellow denotes the original anticipated project area, which roughly corresponds to the pink area in Map 1.

## Background

The City of Flagstaff has seen first-hand the devastating impacts of fire and post-fire flooding following the Schultz Fire on the east side of the San Francisco Peaks in 2010. The cost of fire suppression was approximately \$10 million; however, the actual cost of the fire is many times greater than that figure. Many of those additional costs have been associated with severe, repeated flooding following the fire, with flows originating on the National Forest and traveling into semi-rural residential areas just outside the city limits.

Impacts and costs have included: damage to public infrastructure such as roads and utilities (including an interstate fiber optics cable), destruction of a major city water supply pipeline originating on the mountain, threats to the City landfill, damage to numerous utility lines including a critical interstate fiber optics cable, damage to private property including hundreds of residences, dramatic decline in property values in flooded neighborhoods, emergency and long-term rehabilitation costs on the National Forest exceeding \$5 million, impacts to habitat for Threatened species, archeological resources, loss of merchantable timber and rangeland infrastructure and associated economic activity, increase in noxious weeds, and loss of scenic values and recreational opportunities.

The City is working with the Forest Service to reduce similar threats on National Forest System lands in the Dry Lake Hills area (Rio de Flag Watershed) north of the City of Flagstaff (Map 1) and in the Lake Mary Watershed south of town, which is a critical municipal watershed (Map 2). Projections show that there could be extensive, severe flooding throughout Flagstaff if a high-intensity fire were to occur on the slopes of the Dry Lake Hills, and that the Lake Mary Reservoir, which provides roughly 50 percent of the City's drinking water, could become non-functional due to sediment and carbon influx following a severe wildfire. The City is providing the resources needed to reduce these risks through a \$10 million bond approved by voters in November 2012 with 73% voter approval. These funds will allow the Forest Service and the City to jointly analyze and treat areas that otherwise would not be treated due to prohibitive costs associated with very steep terrain, low value material, and other challenging issues such as wildlife and visual concerns. Some of these funds will also be used to reduce fire danger on nearby State lands.

Existing conditions within the project area include dense stands with numerous dog-hair thickets on steep slopes with high fire risk, with a substantial wildland urban interface (Figure 1). Many of these stands are the mixed conifer forest type that has not often been analyzed or treated in the Southwest. However, research in mixed-conifer forests on the San Francisco Peaks (on the Coconino National Forest) and elsewhere in Arizona will provide new science-based recommendation to inform restoration treatments. Public use of the project area is very heavy, with many heavily-used trails (for both motorized and non-motorized use), camping areas, and rock climbing areas. The area is also eligible for the National Register of Historic Places as a Traditional Cultural Property (TCP), and has religious significance to several Native American tribes in the region.



**Figure 2: Looking down from Forest Road 557 (Elden Lookout Road) within the project area**



### **Objective**

The objective for this project is to reduce the risk of unnatural, high-severity wildfire on roughly 11,000 acres and the associated risk of post-fire flooding by utilizing a variety of treatment options on steep slopes, potentially including cable and helicopter logging methods. The City of Flagstaff will be a cooperating agency with the Forest Service with a Memorandum of Understanding (MOU) delineating expectations and roles for both agencies. There will also be a master participating agreement for the funding aspect of this project to allow bond monies to go toward both the planning and implementation of the project.

### **Putting the Pieces Together**

This project area includes a patchwork of completed NEPA, ongoing Four Forests Restoration Initiative (4FRI) NEPA, and planned new NEPA--all of which are being consolidated under one implementation plan for a total of approximately 14,446 acres. Some areas that are already being analyzed by 4FRI are being included in this planning effort to address additional treatment options (such as helicopter logging on steep slopes), while other 4FRI areas will not be reanalyzed, but implementation would be accelerated under this plan (Map 3). The project area proposed was primarily focused within the Dry

Lake Hills portion of the Rio De Flag 6<sup>th</sup> Code Watershed (the pink areas shown on Map 1), and included the portion of Mormon Mountain that drains into the Lake Mary Watershed. The project boundary was expanded to include more acreage around Mount Elden adjacent to private property, and also to include the National Forest lands next to the Fort Valley Experimental Forest and up to the Kachina Peaks Wilderness boundary (Map 1). On Mormon Mountain, the project boundary was only slightly adjusted to align with feasible treatment boundaries, including Forest roads. These additions were relevant to include in the analysis area to meet the project objectives of fire risk reduction and community protection.

Treatment of areas with existing NEPA clearance: Currently about 1,872 acres within the general project boundary are already covered under previous NEPA decisions: Jack Smith Schultz (2009) and Eastside (2007) Fuels Reduction and Forest Health Restoration Projects (Map 3). The treatable areas covered under those decisions are referred to as “shelf stock” in the attached table and are either being currently implemented or will be implemented in the near future, while the planning process occurs on the rest of the project area. Some areas within the Jack Smith Schultz project area were either determined to be untreatable by ground-based equipment or were designated as No Treatment due to steep slopes and accessibility issues; those are the areas shown in Map 3 that are not included in the Orion Timber Sale shown on the implementation map (Map 4). The Flagstaff Watershed Protection project analysis will include those areas not covered in the Orion Timber Sale.

NEPA planning for areas covered by 4FRI: A portion of the project area (approximately 5,385 acres) within the Dry Lake Hills is also being analyzed by 4FRI (Map 3). Because the Watershed Protection project could potentially be implementable before 4FRI and implementation could include additional treatment options, the analysis and decision will include some overlapping areas (shown with blue crosshatch on Map 3). Approximately 2,630 acres adjacent to the Watershed project area is being analyzed by 4FRI and excluded from additional overlapping analysis and is included in this implementation plan (shown in solid blue on Map 3).

NEPA planning for new areas: Planning for areas not previously covered under other NEPA analyses and for those areas analyzed with limitations not anticipated for this project (due to additional resources and treatment options) is included in the Flagstaff Watershed Protection project area (approximately 5,698 acres in the Dry Lake Hills area and 4,246 in the Lake Mary Watershed). As mentioned above, a portion of the project area also falls within the 4FRI analysis area, namely, those areas that are identified as ponderosa pine vegetation type. The rest of the project area is not within 4FRI as it is identified as mixed conifer vegetation type (4FRI is focused exclusively on Ponderosa Pine ecosystems). The overlapping areas may be removed from the 4FRI analysis between the Draft Environmental Impact Statement (DEIS) and the Final Environmental Impact Statement (FEIS) to eliminate redundancy and confusion. Previous NEPA projects excluded most of the areas being considered in the new planning area because of the lack of merchantable timber present, potential issues with the Threatened Mexican spotted owl (MSO) and related need for Forest Plan amendments to effectively treat in MSO protected habitat, and also due to the difficulty and costs of implementing treatments on steep slopes.

The NEPA planning process is estimated to take roughly 18-24 months, from the kick-off meeting in November 2012 to the end of the 45-day appeal period (estimated for April 2014). This project will have an extensive public outreach effort, one that has already been initiated by the City of Flagstaff and bond advocates during the campaign, and will be continued by both the City and the Forest Service. Other stakeholders are also involved with the project and will likely contribute to the outreach effort, including the Greater Flagstaff Forests Partnership (GFFP). By keeping the public informed early and often, we hope to minimize potential issues involving impacts to trails during implementation, noise, smoke, visual impacts, and contractor access through residential areas.

The Interdisciplinary Team (IDT) is composed of many specialists, including a hydrologist, silviculturist, wildlife biologist, botanist, archaeologist, a number of timber specialists, landscape architect, engineer, fire/fuels specialist, public affairs officer, recreation specialist, tribal liaison, and two team leaders: one to focus on the implementation side of the project, and one to focus on the NEPA planning side. A City representative will also be part of the ID Team and the Implementation Team, with expectations and roles outlined in two Memorandums of Understanding (MOUs). The MOUs will document the cooperation between the two agencies and also grant the City of Flagstaff cooperating agency status for this project. As part of the public information outreach and analysis, the landscape architect's report will include a "visual" analysis to help the public understand what the project area will look like during implementation and immediately after.

#### Treatment schedule for the entire project area

Table 2 and Maps 4 and 5 provide an estimated timeline and implementation sequence for implementation of both shelf stock and "new" areas covered under Flagstaff Watershed Protection analysis.

One assumption of the implementation timeline is that the sale areas will be marked using a Designation by Prescription (DXP) approach, which requires less time to complete than traditional marking (aka leave or cut tree mark) that requires timber personnel to mark either all trees that should be left or all trees that should be cut. In contrast, with DXP, timber personnel mark the boundaries and any areas to avoid, and the contractor must meet the prescription given to them instead of going by the leave/cut tree marks (4FRI, for example, will use DXP). DXP makes layout, marking, and cruising in one field season feasible. However authorization to use DXP must be obtained from the Washington Office. If DXP is determined to not be the best approach and the timber personnel have to use the traditional method, then the estimated time needed for layout, marking and cruising would increase to two field seasons for each unit identified on Maps 4 and 5. Some portions of the project area may not be appropriate for DXP due to the wide range of variability found in mixed conifer stands. Other potential methods for exploration include the Forester Informed Cutter Select Harvest & Monitoring (FISCHM) method currently under development by GFFP with input from the Forest Service and 4FRI Stakeholders. If such a method becomes operational, harvesting and monitoring could occur virtually simultaneously, allowing daily adjustments to meet the cutting prescription.



We currently have a cost estimate for many different treatments from mulching to helicopter logging (Table 1). However at this time we have not yet determined the exact treatments necessary in a given stand, and therefore a total cost estimate for treatments is not possible. A variety of approaches will be proposed, including some ground-based operations. In addition, some areas will likely not be suitable for treatment due to resource issues that will be identified during the NEPA process. These listed costs per acre do not include all the associated costs, such as NEPA analysis, road work, stand exams, wildlife and archaeology surveys, stand preparation (layout, mark, cruise), land-line surveys, contract administration, and monitoring.

**Table 1: Treatment Cost Estimates<sup>2</sup>**

Logging System or Fuels Method	Stump to Truck Cost (\$/ton)	Timber value + value - cost (\$/ ton)	Volume/ac (tons)	+ value - cost (\$/acre)
Ground based	25	+1	30	+30
Skyline	45	-19	30	-570
Skyline(Bunched)	35	-9	30	-270
Excaline with Ground based swing	50	-24	30	-720
Excaline with Ground based swing (Bunched)	40	-14	30	-420
Helicopter	100	-74	30	-2,200
Helicopter (Bunched)	80	-54	30	-1,620
Manually Cut and Hand Pile	N/A	N/A	N/A	-1,200
Feller-Buncher Mechanically Cut and Windrow	N/A	N/A	N/A	-270
Harvester Mechanical Cut And Pile	N/A	N/A	N/A	-600
Mulching	N/A	N/A	N/A	-1,100
Total				

**Treatment Cost Estimate Assumptions:**

- 20 tons of material over 5 inches top with a value of +\$3.50/ton (4FRI)

<sup>2</sup> These cost estimates are very general and pertain to contractor costs only (do not include costs associated with NEPA, TES and archaeological surveys, road maintenance/rehabilitation, etc); costs will vary greatly depending on stand conditions and other variables

Helicopter and cable costs are sensitive to yarding distance, volume/ acre, piece size and leave stand density.

- 10 tons of material under 5 inches top with a value of -\$3.50/ton (4FRI)
- Skyline external yarding distance of 1,400 feet
- Helicopter external flight distance of 3,000 feet
- Piling and mulching treatments assume dense mixed conifer stands on steep ground

### **Accountability and Community Outreach**

The Forest Service and the City will continue to work closely with one another to establish a communication plan to ensure that officials and project advocates receive regular updates and opportunities to comment throughout the planning and implementation process.

Table 2: Implementation Timeline for Shelf Stock and Planned Areas within the Flagstaff Watershed Protect Analysis Area

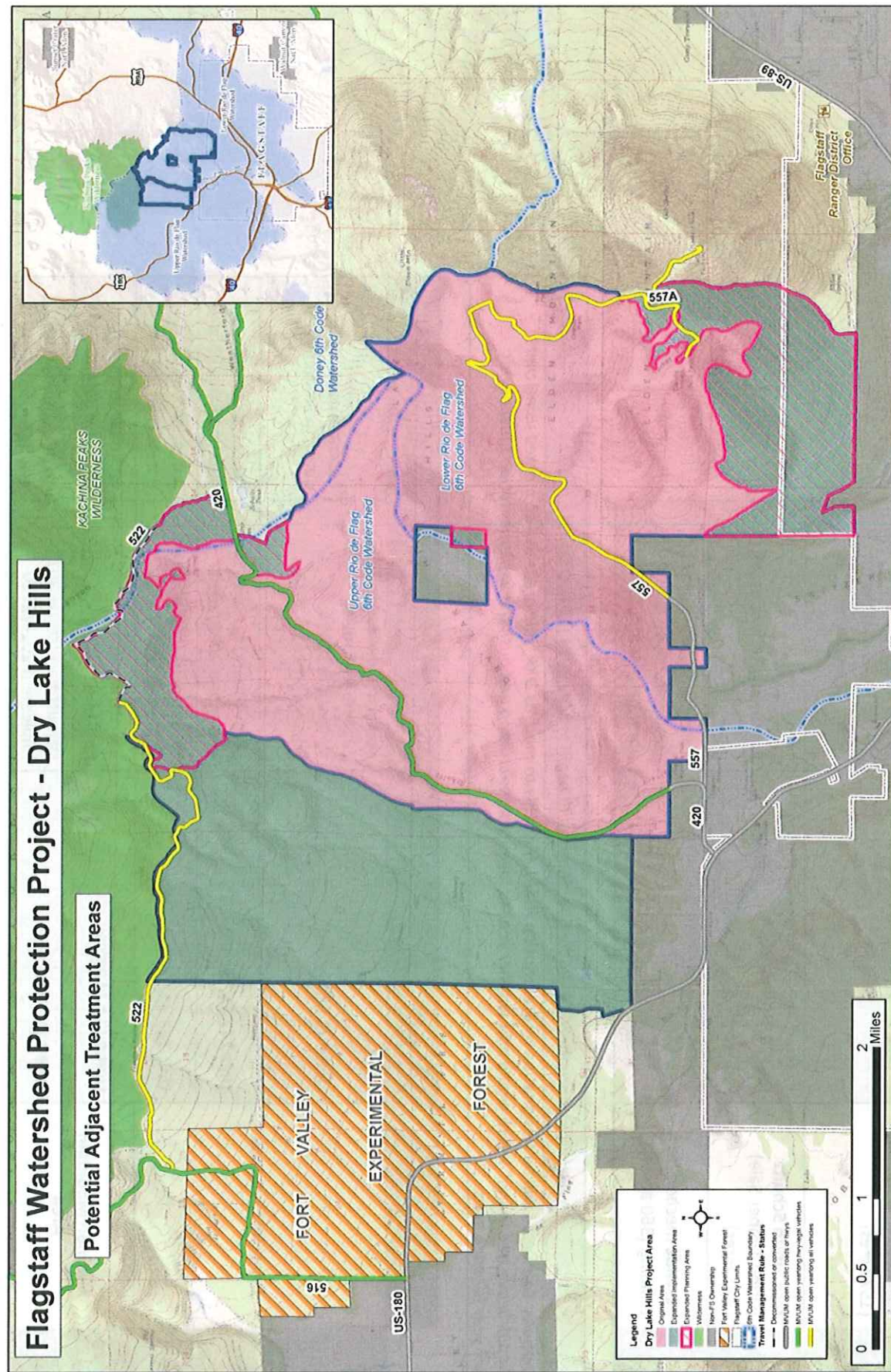
Area	Status	Comments
Shelf Stock	Eastside hand thinning (157 acres)	Estimated completion by end of 2013 120 acres hand thinned and burned in 2012; 37 acres currently being hand thinned, est. completion (thinning and burning) in 2013
	Jack Smith Schultz (Orion Timber Sale) (900 acres)	Laid out in 2012, implementation late 2013/early 2014 Potential 4FRI task order
	Eastside mechanical thinning (360 acres)	Layout in 2013, implement in 2014 Potentially implement in conjunction with Orion; potential pipeline issues

Decision February 2014--Implementation could begin in May 2014 (10,000 acres)		
Assumptions: Sale areas will be Designation by Prescription (DXP). If unable to mark as DXP, sale areas will be marked using the traditional "leave tree mark," which would add another year to layout/mark/cruising and push the implementation timeline out another year for each area.		

Area	Sequence	Schedule	Comments
Planned	Dry Lake Hills Area	Unit 1 (3,651 acres)	Mark boundaries spring 2014; mark/cruise summer/fall 2014; Implement 2015/2016 Potential contract duration limitations
		Unit 2 (2,182 acres)	Layout/mark/cruise 2015; Implement 2016/2017 Potential contract duration limitations
		Unit 3 (3,412 acres)	Layout/mark/cruise 2016; Implement 2017/2018 Potential contract duration limitations
	Mormon Mountain Area	Unit 4 (2,522 acres)	Layout/mark/cruise 2017; Implement 2018/2019 Could combine with 4FRI task orders
		Unit 5 (1,724 acres)	Layout/mark/cruise 2018; Implement 2019/2020 Could combine with 4FRI task orders

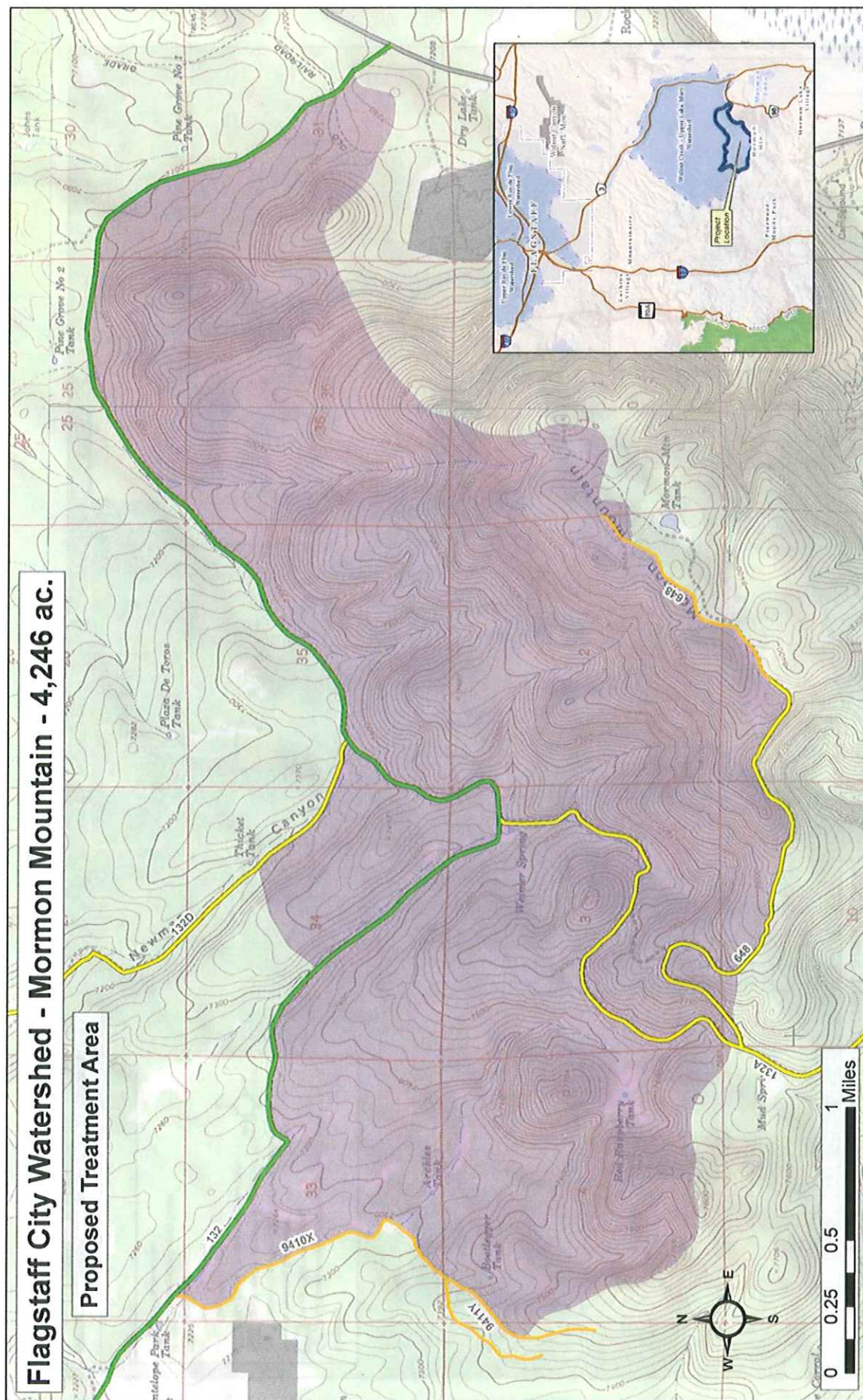


Map 1 : Northern Project Area – Dry Lake Hills



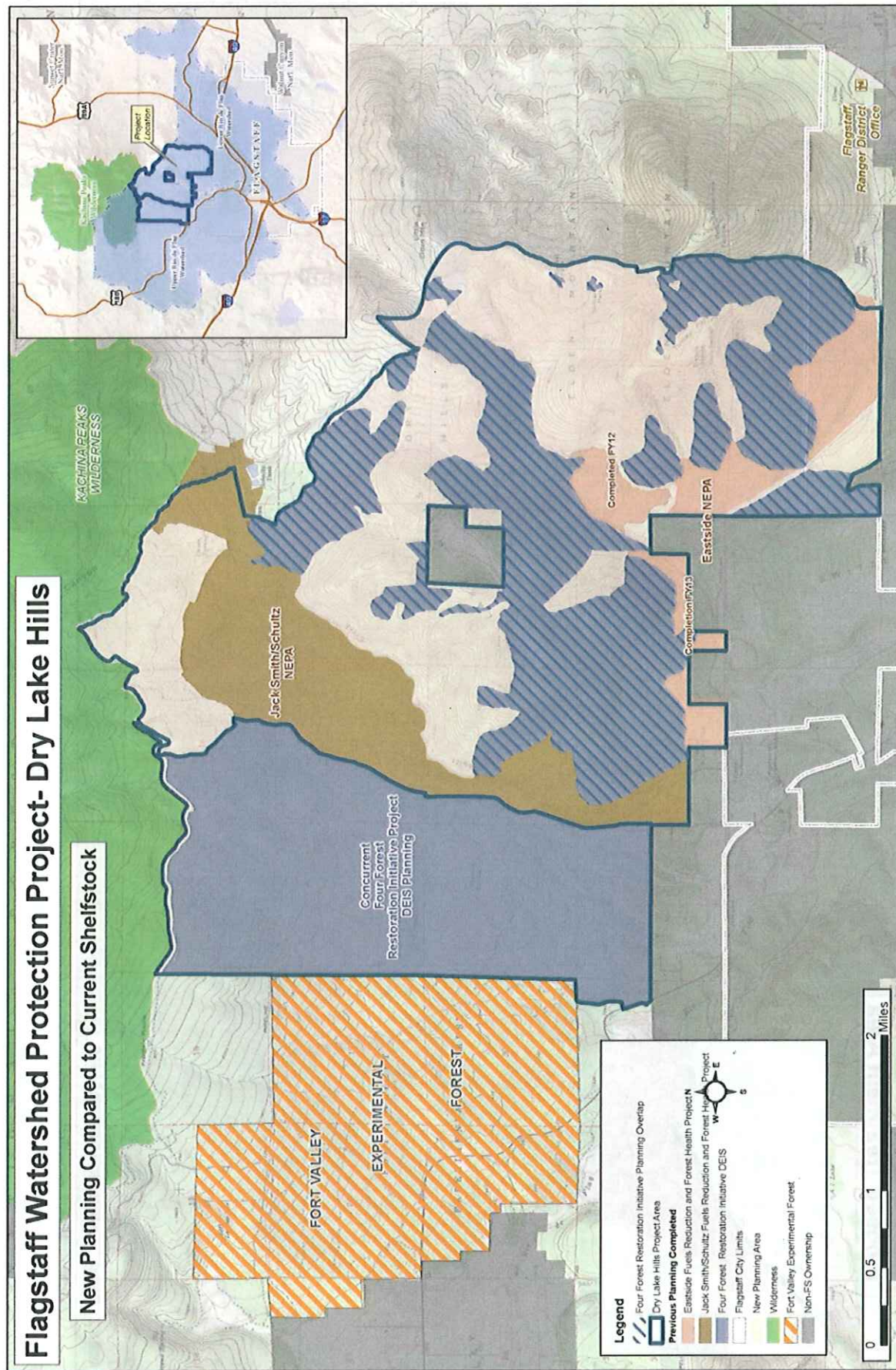


Map 2: Southern Project Area – Mormon Mountain



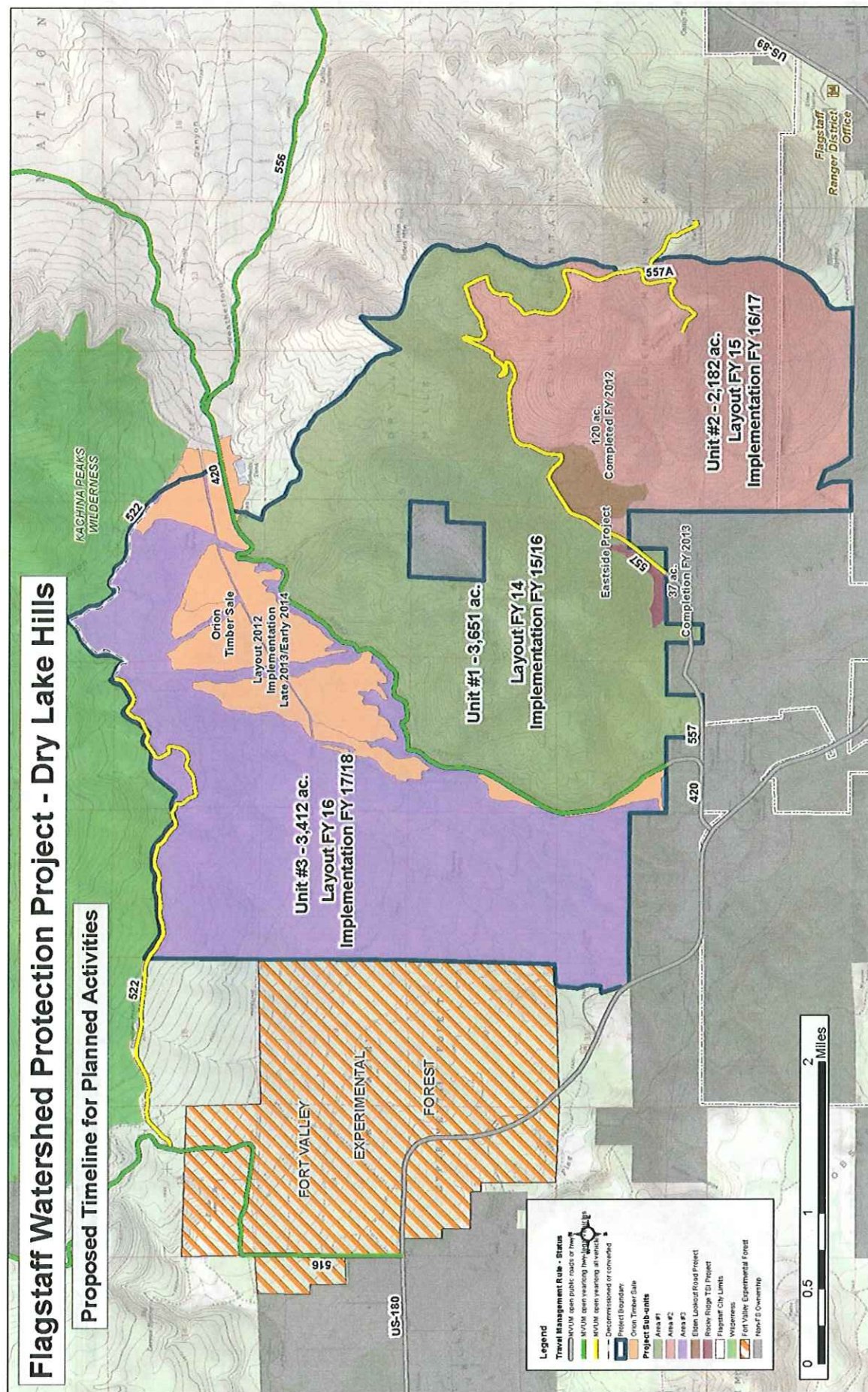


Map 3: Previously Analyzed Areas, 4FRI Overlap and New Planning Area





#### Map 4: Proposed Implementation Timeline – Dry Lake Hills





Map 5: Proposed Implementation Timeline – Mormon Mountain Area

